

Charles Bolden, NASA Administrator

52nd Annual Goddard Memorial Symposium

“Science and Exploration: Engineering the Future”

March 5, 2014

Thank you, Chris [Scolese] for that gracious introduction and thanks to all of you for your commitment to space exploration.

This year's symposium couldn't be more timely. It was my pleasure yesterday to present President Obama's fiscal year 2015 budget request for NASA. At \$17.5 billion, it's a strong vote of support for what we do, and it provides the necessary resources to advance the bipartisan space exploration plan agreed to by the Administration and Congress and ensure that the United States remains the world's leader in space exploration and scientific discovery for years to come.

The budget enables us to keep doing what we have been -- implementing the strategic plan and roadmap that to which we agreed after the shuttle's retirement. This is a plan that is helping us develop new capabilities, bringing new destinations within our grasp and unfolding a new era of exploration on Earth and in space.

Contrary to accusations that we have abandoned exploration and human space flight, over the past six years, the Obama Administration has invested more than \$100 billion in America's space program, including the \$17.5 billion that is part of this year's budget. This plan keeps us moving toward the missions and breakthroughs of tomorrow even as it enables the tangible successes of today. NASA has always pioneered new frontiers. Throughout our history, we've done things that have never been done before, beginning with the earliest advances in aeronautics technology that helped us travel higher and farther.

You can see, throughout our history, how exploration and science have worked together to engineer a future and we're still doing it. Only Americans have ever walked on the moon, and really, we never left. Just last year, I was privileged to have my voice transmitted to the moon and back as part of the Lunar Laser Communications Demonstration, a precursor to technologies we expect to revolutionize our communications with deep space missions.

Only Americans have landed operational robots on Mars, and even as *Curiosity* continues to traverse the planet, we're making plans for *InSight* in 2016 to study the planet's core, and the Mars 2020 rover to gather samples for caching and subsequent return to Earth. And let's not forget *MAVEN* on its way now to study the planet's upper atmosphere.

The 2015 budget keeps us on the same, steady path we have been following since the President signed into law the 2010 Authorization Act. As is our history, we are an agency that does big things and we have programs thriving today in difficult fiscal times and a time of tough decisions, but a time in which we can and do still make BIG decisions. Our major exploration decision is to follow a stepping stone approach to send humans to Mars in the 2030's and to incrementally develop the needed technologies to make that possible.

It's a path that has seen many recent successes in all areas of our work – from the launch of the Global Precipitation Measurement (GPM) mission last week -- the first of an unprecedented five Earth Science launches this year -- to returning space station resupply missions to U.S. soil with American companies, SpaceX and Orbital Sciences.

We completed the power-up of *Orion* and have begun the countdown toward its first flight test later this year and we delivered the final mirrors for the James Webb Space Telescope to the nearby Goddard Space Flight Center late last year.

The budget also supports the Administration's commitment that NASA be a catalyst for the growth of a vibrant American commercial space industry, and keeps us on target to launch American astronauts from right here in the USA by 2017, ending our reliance on the Russians to get into space and freeing us up to carry out even more ambitious missions beyond low-Earth Orbit.

Maybe some of you may have had a chance to meet our newest astronauts, from the 2009 class or the current Astronaut Candidate Class of 2013. Let me tell you, they are excited as can be to head to the International Space Station.

They are even more excited to have the opportunity to help us pioneer new systems for reaching space and lead the way to an asteroid and Mars. Many of them are scientists or engineers or even both. They embody that combination of inquisitiveness and boldness that all explorers must have. And as a group they embody how science and exploration are engineering our future.

We are committed to the International Space Station, and the latest extension -- until at least 2024 -- guarantees we'll have this unique orbiting outpost for at least another decade. This means an expanded market for private space companies, more groundbreaking research and science discovery in microgravity and additional opportunities to live, work and learn in space over longer and longer periods of time.

This budget keeps NASA's deep space exploration program on track by funding the Space Launch System and *Orion* crew vehicle to take American astronauts farther into the solar system than we have ever gone before. Again, our stepping stone approach to sending humans to Mars involves continued research on the Space Station, testing our new capabilities in cis lunar space, exploring an asteroid and, ultimately, sending a crewed mission to the Red Planet.

In order to carry out these pioneering missions, we have to develop technologies for our asteroid redirect mission that will lead to the subsequent first crewed mission to Mars. I know you'll hear from the NASA associate administrators in a little while -- Bill Gerstenmaier, John Grunsfeld, Jaiwon Shin and Mike Gazarik. Mike can tell you more about the many things in the pipeline for space tech.

This budget funds all elements of that stepping stone approach, and actually *increases* funding for efforts that will support the first crewed flight of SLS to an asteroid. Certainly this initiative is a prime example of science and exploration working together to create something larger that draws on our deep benches in both areas.

As we work to identify and characterize more near Earth objects, we're gaining scientific knowledge and as we travel to capture an asteroid, we'll be gaining technological experience that we can apply to other missions. As we send humans on this unprecedented quest we'll be able to demonstrate the capabilities of SLS and *Orion*, at a contingency recovery distance just days away from Earth. We'll get even more science and more valuable operational experience away from low Earth orbit at the same time as we get closer to the ultimate goal of humans on Mars.

In the coming year, we'll build on our nation's record of breathtaking and compelling scientific discoveries and achievements in space, with science missions that will reach far into our solar system, reveal unknown aspects of our universe and provide critical knowledge about our home planet. The budget includes funding for those missions to Mars I mentioned earlier as well as the formulation for a mission to Jupiter's moon, Europa. It also continues to fund science missions already heading toward destinations such as Jupiter and Pluto and operating throughout the solar system – a mission to study our planet's magnetic system, and steady progress on the James Webb Space Telescope and its launch in 2018, even as we begin to work to characterize and define its successor. Never let it be said that we don't plan ahead!

As I'm sure many of you are aware, our science missions are also pioneering exploration technologies and helping pave the way for human missions. *Curiosity*, for instance, has been sending us data about the radiation environment on Mars. Its extraordinary landing also taught us a lot about descent of heavy landing craft through the Martian atmosphere.

We have a lot of NASA scientists here today and tomorrow, including our new Chief Scientist Dr. Ellen Stofan, and I know they're going to have a lot of interesting things to say about our research and our missions.

Under this budget, our pioneering aeronautics research program will continue to focus on substantially reducing aircraft fuel consumption, emissions and noise – and help make the Next Generation Air Transportation System, or NextGen, a reality.

Jaiwon Shin and his team are going to continue to implement the strategic vision for Aeronautics that they launched last year, with a focus on addressing the challenges facing the U.S. aviation community – civil and military – in the coming decades.

All of these investments we continue to make at NASA help drive technology and innovation, spur economic activity and create jobs. That is why under the President's Opportunity, Growth, and Security Initiative (OGSI), with Congressional approval, NASA will receive nearly \$900 million in additional funding in FY15 to focus on specific priorities. This initiative recognizes that the type of innovation and technology development we do helps create opportunity, grow our economy and secure our future.

NASA's portion of OGSI is part of an overall \$56 billion that will be split evenly between defense and non-defense agencies and will be fully paid for by spending cuts and closing tax loopholes.

This fund will be in addition to our \$17.5 billion base funding in the President's FY15 budget, and we will focus on priority areas where we can advance our mission, such as space technology, commercial crew and currently operating and upcoming science missions. It's a way of looking at the big picture of NASA and determining where focused investment could make a big difference.

While we've launched this incredible array of science missions and marked many historic firsts for humans in space, there's so much more left to do.

As the theme of this conference suggests, the success of America's space program depends on all of our priorities and all of the people responsible for them working together as an interdependent whole.

That's reflected in a lot of what we have coming up. All of the Mars missions I mentioned are building a path to the Red Planet for humans.

We are still working to have Orion ready to fly in late September for an uncrewed flight test. Exploration Flight Test-1 will see *Orion* conduct two orbits of Earth and reenter the atmosphere at a high-speed characteristic of a returning deep space exploration mission. The test will provide valuable data about the spacecraft's systems and its critical heat shield.

Orion is going to break barriers for human exploration. As we learned with Apollo, what we learn about humans traveling and living in space, and the things we bring back, will also be invaluable to science and the improvement of life right here on Earth. We also are at the beginning of looking at how the SLS on which *Orion* launches could support science payloads as well.

Our unique orbiting outpost, the ISS is possibly our greatest example of science and exploration working together, and I couldn't be happier that we'll have it available to us until at least 2024. The astronauts aboard the Station have helped us carry out hundreds of experiments, and they themselves are living experiments whose every vital sign is registered to help us create a baseline of data about humans living and working in space.

Next year we'll begin the yearlong mission of Scott Kelly aboard the Station, another milestone in what is now going on 14 years of continuous human presence in space aboard the ISS.

When I flew the shuttle to space, we didn't have the platform for such long-term work in space, let alone the amazing laboratory facilities of the Station, but none-the-less, each of those missions had science as an integral part and each was made possible by science and exploration working hand-in-hand.

NASA thrives on the synergy created by an interdependent and critical mass of brilliant scientific and engineering talent. We all are contributors to a mission greater than ourselves, extending beyond the current generation. We tackle national and global challenges. We are pioneers. We reach higher. We lead the way for those who would join us and help us to continue to turn science fiction into science fact and make the impossible possible.

I hope everyone enjoys this 52nd Goddard Memorial Symposium and thank you for allowing me to spend time with you today.

Thank you.